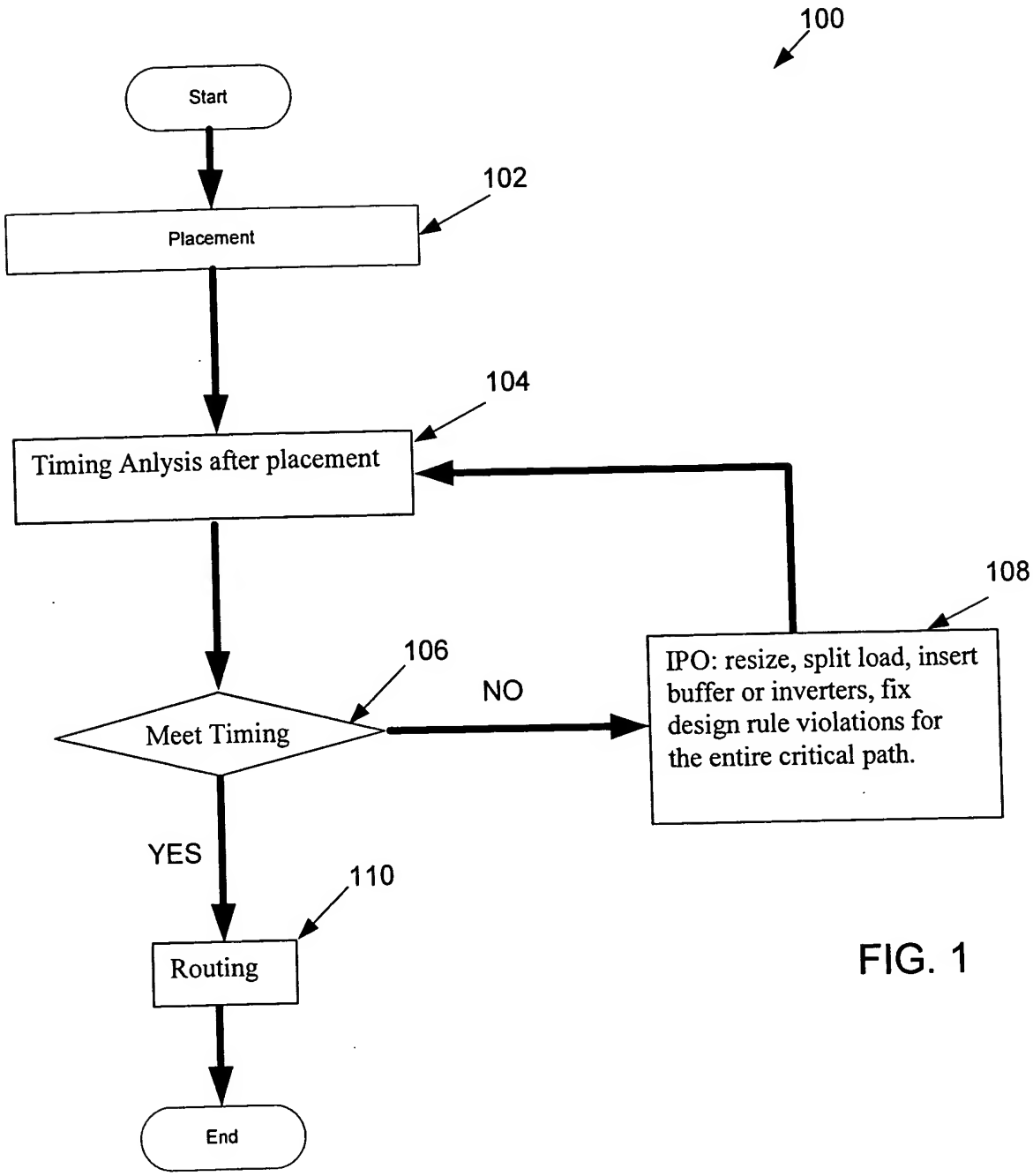
100
Start
102
Placement
104
Timing Anlysis after placement
108
IPO: resize, split load, insert buffer or inverters, fix design rule violations for the entire critical path.
106
NO
Meet Timing
YES
110
Routing
End

FIG. 1

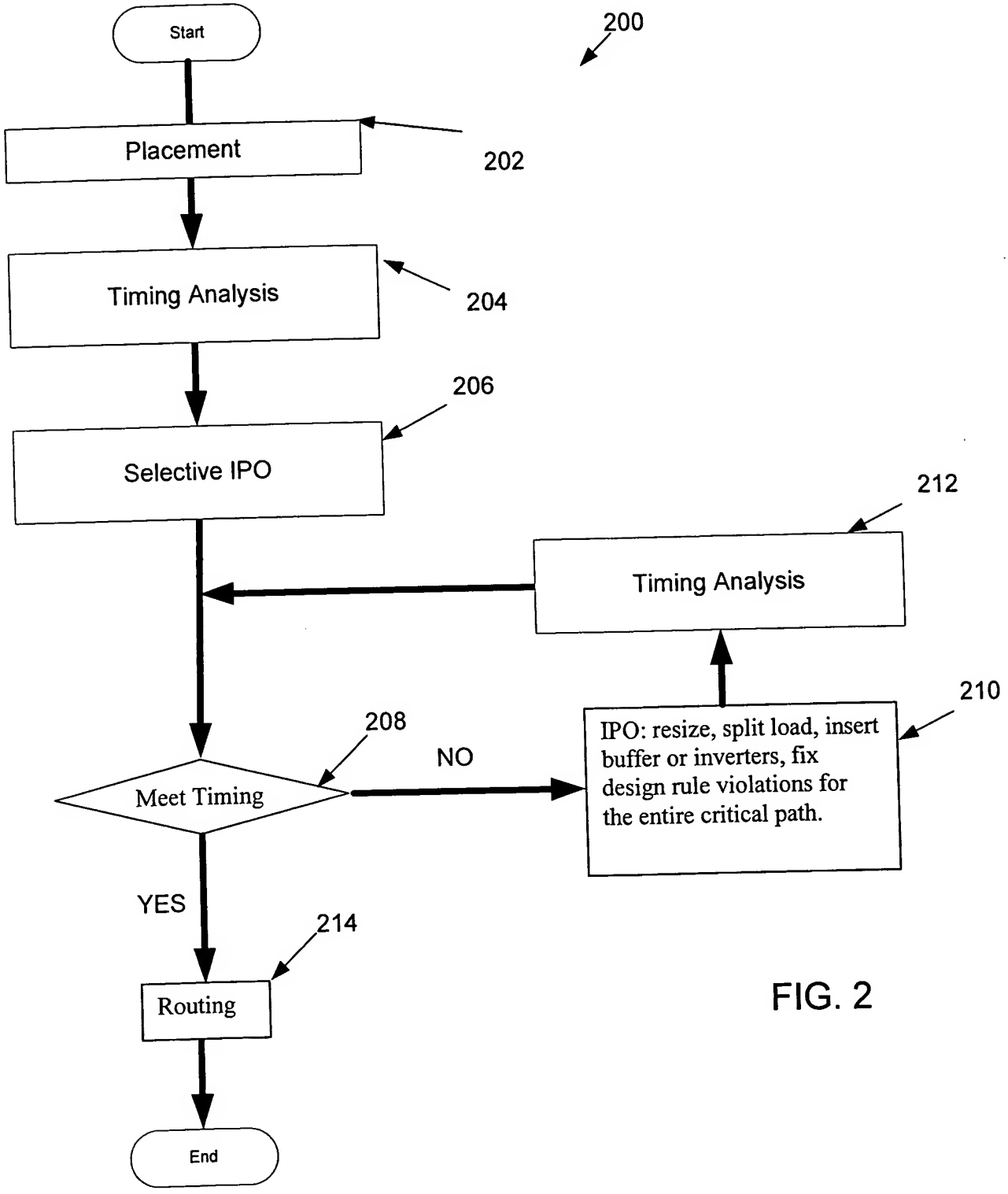
Start
200
Placement
202
Timing Analysis
204
206
Selective IPO
212
Timing Analysis
210
208
NO
Meet Timing
IPO: resize, split load, insert buffer or inverters, fix design rule violations for the entire critical path.
YES
214
Routing
End

FIG. 2

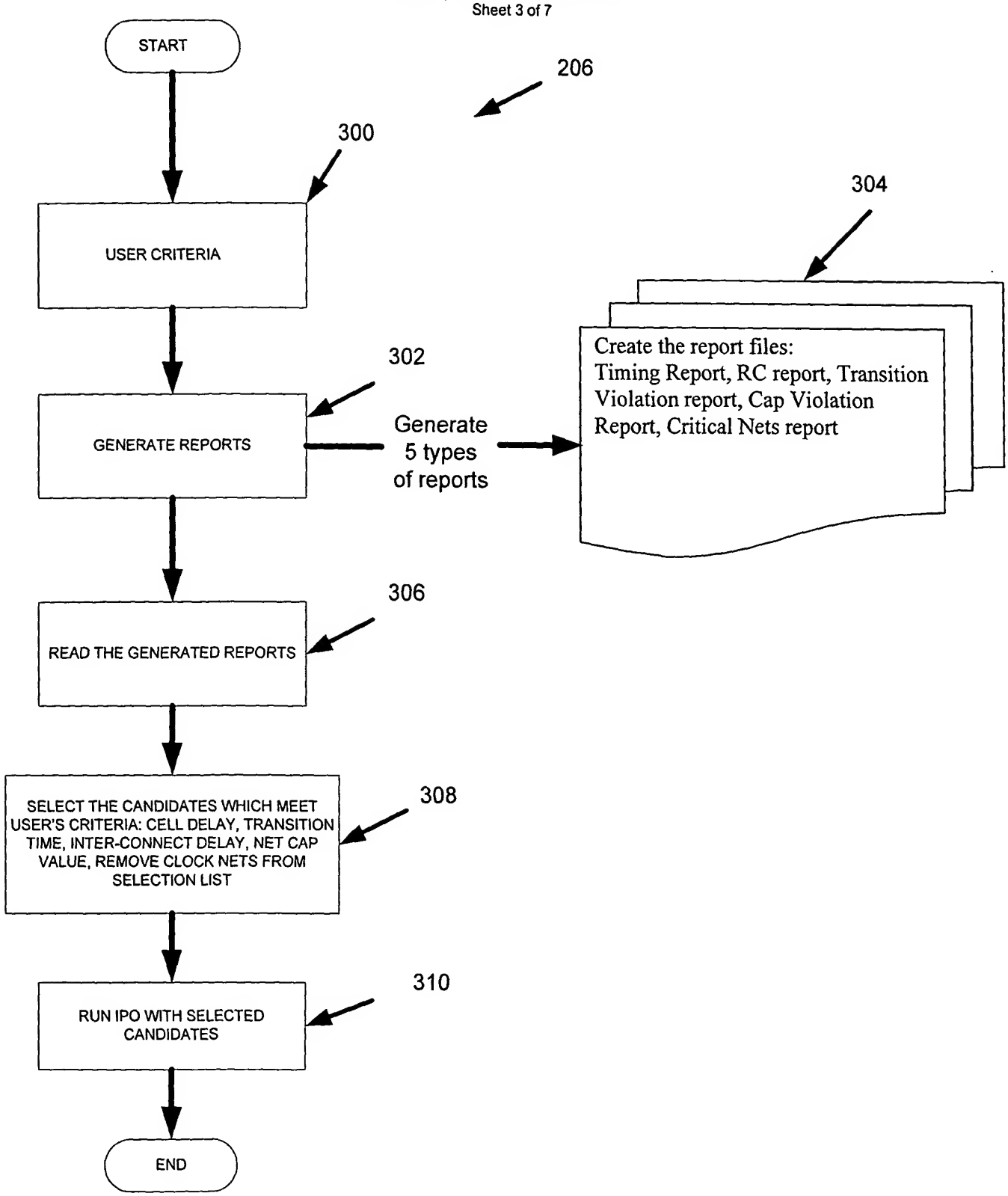
START
206
300
USER CRITERIA
304
Create the report files:
Timing Report, RC report, Transition Violation report, Cap Violation Report, Critical Nets report
302
GENERATE REPORTS
Generate 5 types of reports
306
READ THE GENERATED REPORTS
SELECT THE CANDIDATES WHICH MEET USER'S CRITERIA: CELL DELAY, TRANSITION TIME, INTER-CONNECT DELAY, NET CAP VALUE, REMOVE CLOCK NETS FROM SELECTION LIST
308
RUN IPO WITH SELECTED CANDIDATES
310
END

FIG.3

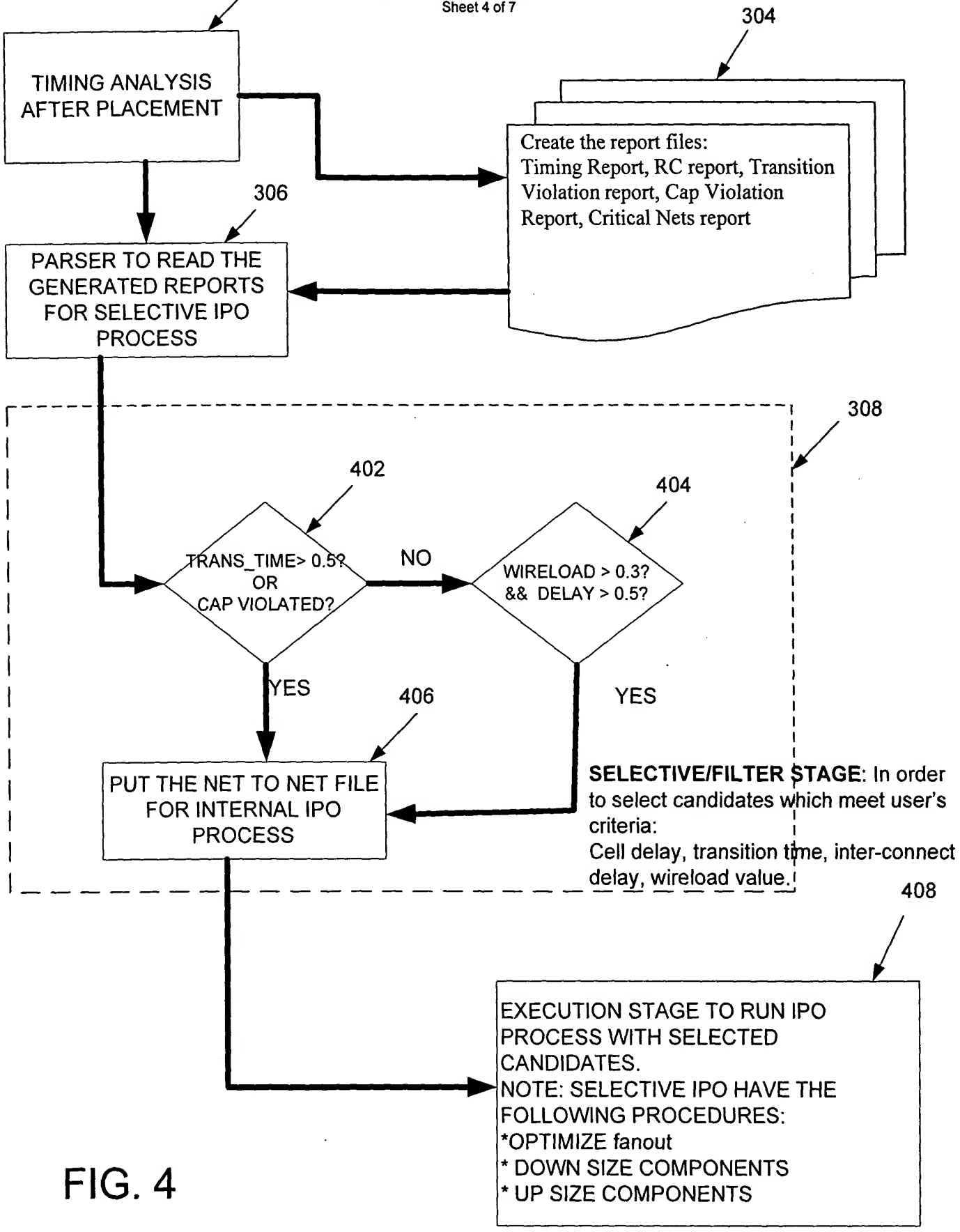
204, 302
TIMING ANALYSIS AFTER PLACEMENT
304
Create the report files:
Timing Report, RC report, Transition Violation report, Cap Violation Report, Critical Nets report
306
PARSER TO READ THE GENERATED REPORTS FOR SELECTIVE IPO PROCESS
308
402
TRANS_TIME> 0.5? OR CAP VIOLATED?
NO
404
WIRELOAD > 0.3? && DELAY > 0.5?
YES
YES
406
PUT THE NET TO NET FILE FOR INTERNAL IPO PROCESS
SELECTIVE/FILTER STAGE: In order to select candidates which meet user's criteria:
Cell delay, transition time, inter-connect delay, wireload value.
408
EXECUTION STAGE TO RUN IPO PROCESS WITH SELECTED CANDIDATES.
NOTE: SELECTIVE IPO HAVE THE FOLLOWING PROCEDURES:
*OPTIMIZE fanout
* DOWN SIZE COMPONENTS
* UP SIZE COMPONENTS

FIG. 4

Capacitance Violation File

# InstPin	MaxCap	Cap	CapSlack	CellPort
#				
i_meu/ibiu_i_inst/U1217/Y	0.171	0.898	-0.727	BUFX2TH/Y
i_meu/miu_i_inst/U6094/Y	1.024	1.743	-0.719	BUFX12TH/Y
i_meu/U1/Y	0.085	0.796	-0.711	INVX1TH/Y
i_meu/biu_i_inst/U1215/Y	0.341	1.042	-0.701	BUFX4TH/Y
i_meu/biu_i_inst/U1230/Y	0.171	0.870	-0.699	BUFX2TH/Y
i_meu/biu_i_inst/U1207/Y	0.341	1.039	-0.698	BUFX4TH/Y

FIG. 5A

Transition timing report

# InstPin	MaxTranTime	TranTime	TranSlack	CellPort
i_bci/u_bcif/U416/A	1.500	11.272r/6.066f	-9.772r/-4.566f	NAND2X1TH/A
i_meu/U1/Y	1.500	11.272r/6.066f	-9.772r/-4.566f	INVX1TH/Y
i_bci/u_parsch/U1046/A0	1.500	11.272r/6.066f	-9.772r/-4.566f	AO22X1TH/A0
i_reg_cntrl/U29/Y	1.500	11.003r/4.024f	-9.503r/-2.524f	NOR2BX1TH/Y
i_reg_cntrl/TIME/D1	1.500	11.003r/4.024f	-9.503r/-2.524f	SMDFFHQX1TH/D1
i_reg_cntrl/FSM/U12/Y	1.500	10.955r/4.010f	-9.455r/-2.510f	NOR2X1TH/Y
i_bci/mio_read/U351/Y	1.500	10.628r/2.944f	-9.128r/-1.444f	NOR4X1TH/Y

FIG. 5B

Critical Net report

i_vs/i_alu/i_source_sel/SPCDPN13319_n2584
i_vs/i_alu/i_source_sel/SPCDPN13318_n2647
i_vs/i_alu/i_source_sel/SPCDPN13317_n2549
i_vs/i_alu/i_source_sel/SPCDPN13316_n2547
i_vs/i_alu/i_vector_even/i_muladd_vec/SPCDPN13310_n38174
i_thiu/TIS_FFCTL/SPCDPN13292_n455
i_vs/i_alu/i_source_sel/SPCDPN13268_n4692
i_thiu/PROC_2D/U_th_2d_img_seq/SPCDPN13263_n5244

FIG. 5C

Timing Analysis report file

Object name

Delta r/f (ns)	Sum r/f (ns)	Slew (ns)	Load (pf)	Cell Location (um)
INST1 CK->Q (SDFFRHQX8TH)				
0.320f/0.346r	0.320f/0.346r	0.120f/0.120r	0.110	(1291.22, 1380.06)
INST2 A->Y (BUFX20TH)				
0.208f/0.235r	0.529f/0.582r	0.190f/0.210r	0.426	(1293.52, 1376.37)
INST3 B->Y (NAND2X4TH)				
0.099r/0.089f	0.632r/0.675f	0.230f/0.313r	0.005	(1259.94, 1372.68)

FIG. 5D

Selective IPO Netfile

i_vs/i_alu/i_source_sel/n4132

i_vs/i_alu/i_source_sel/n4063

i_vs/i_alu/i1_seta/SPCDPN4239_x0_odd_18_

i_vs/i_alu/i_source_sel/n4092

i_vs/i_alu/i0_float_fix/n53

i_vs/i_alu/n1447

i_vs/i_alu/n1448

FIG. 5E

IPO command file

```
genIPONets $CellDelay $OutputTransition $NetCap
setIPOMode -mediumEffort -noFixDrc -addPortAsNeeded -noPreserveRoute \
-targetSlack 0 -maxDensity 0.90 -selHInst {} -excHInst {}
optFanout -selNetFile .netFile
trialRoute
extractRC
updateTimingGraph

genIPONets $CellDelay $OutputTransition $NetCap
setAnalysisMode -setup -async -noSkew -autoDetectClockTree
updateTimingGraph

setIPOMode -mediumEffort -noFixDrc -addPortAsNeeded -noPreserveRoute \
-targetSlack 0 -maxDensity 0.90 -selHInst {} -excHInst {}
initECO
updateTimingGraph

isTimingMet -fast -targetSlack 0.0
setIPOMode -preserveRoute
downsize -selNetFile .netFile
resize -selNetFile .netFile
setIPOMode -noPreserveRoute
extractRC
updateTimingGraph

isTimingMet -fast -targetSlack 0.0
optFanout -selNetFile .netFile
trialRoute
extractRC
updateTimingGraph

isTimingMet -fast -targetSlack 0.0
upsize -selNetFile .netFile
trialRoute
extractRC
updateTimingGraph

cleanupECO
savedesign $my_design.enc
```

FIG. 6